

CLAIMS

What is claimed is:

1. An apparatus for use in gripping a cylindrical member, the apparatus comprising:
 - a body for delivering the gripping apparatus to the cylindrical member;
 - an insert having teeth for gripping the cylindrical member, wherein said insert is supported by and movable relative to said body;
 - a cam member having a longitudinal axis, wherein said cam member is rotatably supported by said body; and

wherein said cam member is disposed between said body and said insert and configured to engage said body and said insert such that when said insert moves relative to said body, said cam member rotates about said longitudinal axis.
2. The apparatus of claim 1 wherein said cam member is generally cylindrically shaped.
3. The apparatus of claim 1 wherein:
 - said cam member has a base portion and a lobe portion, said base portion having a base camming surface and said lobe portion extending from said base portion and having a lobe camming surface; and

said insert has a C-shaped groove for receiving said lobe portion and engaging said lobe camming surface.
4. The apparatus of claim 3 wherein said base portion has a base width and said lobe portion has a lobe width, wherein said base width is greater than said lobe width.

5. The apparatus of claim 1 further comprising a plurality of said inserts and a plurality of said cam members such that when a force is applied to said inserts, said inserts move and said cam members rotate substantially simultaneously, thereby intensifying the gripping force exerted on the cylindrical member.
6. The apparatus of claim 1 wherein said body further comprises a cam face having an insert recess and a cam member recess, wherein said insert is disposed within said insert recess and said cam member is disposed within said cam member recess such that said body and said insert substantially enclose said cam member.
7. The apparatus of claim 6 wherein said cam member further comprises a body camming surface and an insert camming surface, wherein said body camming surface cammingly engages the surface of said cam member recess and said insert camming surface cammingly engages the surface of said insert recess.
8. The apparatus of claim 1 wherein said cam member extends substantially the entire length of said body.
9. The apparatus of claim 1 further comprising a means for supporting said cam member.
10. The apparatus of claim 9 wherein said supporting means comprises:

said body having a top end and a bottom end, wherein said top and bottom ends lie in planes substantially perpendicular to said longitudinal axis of said cam member;

 a first plate releasably attached to said top end;

 a first pin extending into a first slot in said cam member coincident with said longitudinal axis, said first pin being supported by said top plate;

 a second plate releasably attached to said bottom end; and

 a second pin extending into a second slot in said cam member coincident with said longitudinal axis, said second pin being supported by said bottom plate.

11. The apparatus of claim 10 wherein said first and second pins are replaced by a pin and slot extending completely through said cam member coincident with said longitudinal axis, said pin being supported by said top and bottom plates.

12. The apparatus of claim 9 wherein said supporting means comprises:

 said body having a top end and a bottom end, wherein said top and bottom ends lie in planes substantially perpendicular to said longitudinal axis of said cam member;

 a first plate releasably attached to said top end;

 a first protrusion extending from said cam member into a first slot in said top plate coincident with said longitudinal axis;

 a second plate releasably attached to said bottom end; and

 a second protrusion extending from said cam member into a second slot in said bottom plate coincident with said longitudinal axis.

13. The apparatus of claim 1 further comprising a means for supporting said insert.
14. The apparatus of claim 13 wherein said supporting means includes:
 - 1 said body having a top end and a bottom end, wherein said top and bottom ends lie in planes substantially perpendicular to said longitudinal axis of said cam member;
 - 2 a first plate releasably attached to said top end;
 - 3 a first pin extending into a first elongate slot in said insert, said first pin being supported by said top plate;
 - 4 a second plate releasably attached to said bottom end; and
 - 5 a second pin extending into a second elongate slot in said insert, said second pin being supported by said bottom plate.
15. The apparatus of claim 14 wherein said first and second pins are replaced by a pin and elongate slot extending completely through said insert, said pin being supported by said top and bottom plates.
16. The apparatus of claim 13 wherein said supporting means includes:
 - 1 said body having a top end and a bottom end, wherein said top and bottom ends lie in planes substantially perpendicular to said longitudinal axis of said cam member;
 - 2 a first plate releasably attached to said top end;
 - 3 a first protrusion extending from said insert into a first elongate slot in said top plate;
 - 4 a second plate releasably attached to said bottom end; and

a second protrusion extending from said insert into a second elongate slot in said bottom plate.

17. The apparatus of claim 3 further comprising a means for supporting said insert.
18. The apparatus of claim 17 wherein said supporting means includes:
 - at least one tracking edge disposed on said lobe camming surface; and
 - at least one groove disposed in said C-shaped groove for receiving and engaging said tracking edge.
19. An apparatus for use in gripping a cylindrical member, the apparatus comprising:
 - a body having an engaging face and a cam face, said cam face having at least one insert recess, wherein said insert recess further comprises at least one cam recess;
 - a cam member having a longitudinal axis and extending through said cam recess, said cam member having a first camming surface engaging the surface of said cam recess and a second camming surface opposite said first camming surface;
 - at least one insert having teeth for gripping the cylindrical member, said insert engaging said second camming surface and partially disposed within said insert recess; and
 - wherein said cam member is rotatable about said longitudinal axis such that when said insert moves relative to said body, said cam member rotates.
20. The apparatus of claim 19 wherein:

said cam member has a base portion adjacent said first camming surface and a lobe portion extending from said base portion and adjacent said second camming surface; and
 said insert has a C-shaped groove for receiving said lobe portion and engaging said second camming surface.

21. The apparatus of claim 20 wherein said base portion has a base width and said lobe portion has a lobe width, wherein said base width is greater than said lobe width.

22. An apparatus for use in gripping a cylindrical member, the apparatus comprising:
 a body for delivering the gripping apparatus to the cylindrical member;
 an insert having teeth for gripping the cylindrical member, wherein said insert is supported by and movable relative to said body, and wherein said insert comprises:
 a base member having a longitudinal axis and a perpendicular axis;
 a plurality of teeth extending from said base member, each of said teeth having a width, and wherein said teeth are formed in a first and second row, said first and second rows being substantially adjacent and parallel to said longitudinal axis; and
 wherein said teeth in said first row are offset longitudinally from said teeth in said second row;
 a cam member having a longitudinal axis, wherein said cam member is rotatably supported by said body; and

wherein said cam member is disposed between said body and said insert and configured to engage said body and said insert such that when said insert moves relative to said body, said cam member rotates about said longitudinal axis.

23. The insert of claim 22 wherein said teeth have a resistance profile, wherein said resistance profile is a substantially straight line.
24. The insert of claim 22 wherein the insert has a length and said teeth have an effective resistance length, said resistance length being at least 75% of said insert length.
25. The insert of claim 24 wherein said resistance length is approximately 100% of said insert length.
26. A jaw assembly for use in gripping a cylindrical member, the jaw assembly comprising:
 - a tong body;
 - at least two piston cylinders supported by said tong body such that said piston cylinders are circumferentially spaced about the cylindrical member, each of said piston cylinders having a piston extending through said piston cylinder;
 - first and second hydraulic fluid conduits supported by said tong body, wherein said first and second conduits are in fluid communication with said piston cylinders;
 - a jaw body removably attached to each of said piston cylinders;
 - an insert having teeth for gripping the cylindrical member, wherein said insert is supported by and movable relative to said jaw body;

a cam member having a longitudinal axis, wherein said cam member is rotatably supported by said jaw body; and

wherein said cam member is disposed between said jaw body and said insert and configured to engage said jaw body and said insert such that when said insert moves relative to said jaw body, said cam member rotates about said longitudinal axis.

27. The apparatus of claim 26 wherein:

said cam member has a base portion for engagement with said jaw body and a lobe portion extending from said base portion for engagement with said insert; and

said insert has a C-shaped groove for receiving said lobe portion.

28. The apparatus of claim 27 wherein said base portion has a base width and said lobe portion has a lobe width, wherein said base width is greater than said lobe width.

29. A method for gripping a cylindrical member, the method comprising:

delivering a gripping apparatus to the cylindrical member, the gripping apparatus comprising:

a body for delivering the gripping apparatus to the cylindrical member;

an insert having teeth for gripping the cylindrical member, wherein said insert is supported by and movable relative to said body;

a cam member having a longitudinal axis, wherein said cam member is rotatably supported by said body; and

wherein said cam member is disposed between said body and said insert and configured to engage said body and said insert such that when said insert moves relative to said body, said cam member rotates about said longitudinal axis; engaging said insert teeth with the cylindrical member; imposing a gripping force on the cylindrical member; rotating said gripping apparatus, thereby moving said insert and rotating said cam member; and intensifying said gripping force.

30. The method of claim 29 wherein:

said cam member has a base portion and a lobe portion, said base portion having a base camming surface and said lobe portion extending from said base portion and having a lobe camming surface; and

said insert has a C-shaped groove for receiving said lobe portion and engaging said lobe camming surface.

31. The method of claim 30 wherein said base portion has a base width and said lobe portion has a lobe width, wherein said base width is greater than said lobe width.

32. The method of claim 29 further including the step of preventing slippage of the insert teeth relative to the cylindrical member.